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Structural Framing
of
SOUTHERN YELLOW PINE

Specification and Design Information and
Data for the Use of Architects
and Engineers

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Southern Pine Association
Architectural and Engineering Service Department
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Southern Pine Association

STRUCTURAL FRAMING OF SOUTHERN YELLOW PINE

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UTILIZATION OF SHORT LENGTHS

UTILIZING short-length lumber in lengths less than eight (8) feet, savings of fifteen to twenty per cent. can be effected in the cost price of the material at the mill. To determine the practicability of buying short lengths of lumber for use in lumber-built structures, a survey of lumber construction uses was recently undertaken under the auspices of the U. S. Department of Commerce and the Central Committee on Lumber Standards. As a result of this study, it was found that approximately one-third of the lumber delivered to the job for the construction of frame houses in long lengths was recut into lengths less than eight feet during the process of construction, and that eleven per cent. in addition was cut into eight to nine foot lengths. Analyzing the use of short lengths in greater detail, it was found that the largest percentage in board feet of lumber used in lengths under eight feet occurred in exterior porch flooring and miscellaneous uses such as stair carriages; the next largest percentage in wood ceiling and sheathing; and successively decreasing percentages in the order of the following applications: studs, roofing and siding, flooring, rafters and joists. With the possible exception of rafters and joists, it is feasible to purchase short lengths of lumber for use in the construction of lumber-built houses in each of the above items.

According to data presented at the National Lumber Conference of May 1925, at least 5 per cent. of the total softwood yard lumber produced for general building purposes is under eight feet in length. The waste of timber products, arising from poor design of structures and improper utilization of available

supplies, demands more economical practices and improved methods in building construction.

STOCK SIZES

THE DIMENSIONS of lumber and timber are generally specified in the count, rough or nominal sizes. To make the necessary allowances for shrinkage and surfacing from the rough green sizes, the actual dimensions of the worked or surfaced lumber are fixed by the American Lumber Standards as described in Simplified Practice Recommendation No. 16 of the U.S. Department of Commerce. The rules for sizes and the standard specifications for grades of Southern Yellow Pine lumber and timber are in accord with the American Lumber Standards.* Wherever practicable, stock sizes should be specified, as lumber finished in different sizes will require special manufacture. For greatest economy, narrowest available widths of lumber should be used wherever they will meet the requirements of construction.

RECOMMENDED USE SPECIFICATIONS

THE SUCCESS of a lumber-built structure depends upon the selection of the right material, upon good design and upon workmanlike construction. Frequently, failure of the superstructure results from poor and insufficient foundations. Foundations walls or footings of inadequate size and strength mean unequal settlement which is transmitted to the lumber-built superstructure, and results in cracked plastering, in binding doors and windows, in squeaky floors, and in walls that are not weathertight.

*See Bulletin No. 4 of this series for Southern Yellow Pine Standards.

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The following Use Specifications are offered as a guide for the use of Southern Yellow Pine in the most economical grades and those best suited to the specific purpose for which they are used. Wherever possible, the better grades of lumber should not be used where inferior grades suffice. The general commercial grades herein specified meet all usual structural purposes; if greater strength is desired, the material may be graded for Density in addition to the requirements of the standard specifications. Where conditions might induce rapid decay, or where there might be likelihood of attack by termites, lumber treated with preservatives may be utilized to insure permanence.*

BUILDINGS

SILLS AND SLEEPERS

Untreated—

- No. 1 Common Heart (85% Girth Meas.)
- No. 1 Common Heart (75% Girth Meas.)
- Merchantable

Treated—

- Square Edge & Sound
- No. 1 Common

POST AND CAPS

Untreated—

- Select Structural
- No. 1 Common Heart (85% Girth Meas.)
- Merchantable

Treated—

- Square Edge & Sound
- No. 1 Common

BEAMS, JOISTS, RAFTERS AND PURLINS

Untreated—

- Select Structural
- Merchantable
- No. 1 Common and No. 2 Common

Treated—

- Square Edge & Sound
- No. 1 Common and No. 2 Common

GIRDERS

Untreated—

- Select Structural
- Merchantable
- No. 1 Common

Treated—

- Square Edge & Sound
- No. 1 Common

ROUGH FRAMING

Untreated—

- Merchantable
- No. 1 Common and No. 2 Common

Treated—

- Square Edge & Sound
- No. 1 Common and No. 2 Common

T & G ROOF PLANK

Untreated—

- Merchantable
- No. 1 Common and No. 2 Common

Treated—

- Square Edge & Sound
- No. 1 Common and No. 2 Common

SUB-FLOORING (PLANK)

Untreated—

- No. 1 Common Heart (85% on both faces)
- Merchantable
- No. 1 Common and No. 2 Common

Treated—

- Square Edge & Sound
- No. 1 Common

SUB-FLOORING, SHEATHING AND SIDING (BOARDS)

- No. 1 Common, No. 2 Common & No. 3 Common

CEILING AND PARTITION

Natural Finish—

- B & Better
- No. 1 Common

Paint Finish—

- No. 1 Common and No. 2 Common

INTERIOR TRIM AND MOULDINGS

Natural Finish—

- B & Better

Painted Finish—

- No. 1 Common and No. 2 Common

EXTERIOR TRIM, DOORS AND WINDOW FRAMES

Select—

- B & Better
- No. 1 Common

Common—

- No. 1 Common and No. 2 Common

FINISH FLOORING**

FENCING

POSTS

Untreated—

- No. 1 Common Heart (85% Girth Meas.)
- No. 1 Common Heart (75% Girth Meas.)

*See Bulletin No. 3 of this series for discussion on preservative treatments.

**See Bulletin No. 1 of this series for Finish Flooring and Bulletin No. 5 for Heavy Service Floors.

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Treated—

Square Edge & Sound
No. 1 Common

RAILS

Untreated—

No. 1 Common Heart (85% Girth Meas.)
Merchantable

Treated—

Square Edge & Sound
No. 1 Common and No. 2 Common

BATTENS AND PICKETS

Untreated—

No. 1 Common Heart (both faces)
B & Better

Treated—

No. 1 Common and No. 2 Common

BOARDS

Untreated—

No. 1 Common and No. 2 Common Heart (both faces)

Treated—

No. 1 Common and No. 2 Common

TANKS and TANK SUPPORTS

TANK BOTTOMS AND STAVES*

Untreated—

Select Structural
Merchantable

Treated—

Square Edge & Sound
No. 1 Common

JOISTS, RAFTERS, BRACING

Untreated—

Select Structural
Merchantable
No. 1 Common

Treated—

Square Edge & Sound
No. 1 Common

EXTERIOR PLATFORMS & CROSSING PLANK

SUB-FLOORING AND WEARING SURFACE

Untreated—

No. 1 Common Heart (85% on both faces)
Merchantable

Treated—

Square Edge & Sound
No. 1 Common

TEMPORY FALSE WORK

SILLS, POSTS AND CAPS

Merchantable
Square Edge & Sound
No. 1 Common

STRINGERS

Merchantable
Square Edge and Sound
No. 1 Common

BEAMS, JOISTS AND CENTERING

No. 1 Common and No. 2 Common

LAGGING AND BRACING

No. 1 Common and No. 2 Common

SCAFFOLD PLANK

Dense Merchantable
Dense No. 1 Common

CONCRETE FORMS

DIMENSION LUMBER AND PLANKS

No. 1 Common and No. 2 Common

T & G BOARDS

No. 1 Common and No. 2 Common

BRIDGES and TRESTLES

SILLS, POSTS AND CAPS

Untreated—

Select Structural
Merchantable

Treated—

Square Edge and Sound
No. 1 Common

BRACING AND RANGERS

Untreated—

Merchantable
No. 1 Common

Treated—

Square Edge and Sound
No. 1 Common

STRINGERS

Untreated—

Select Structural
Dense Merchantable

Treated—

Dense Square Edge and Sound

GUARD TIMBERS AND RAILINGS

Untreated—

Select Structural
Merchantable

Treated—

Square Edge and Sound
No. 1 Common

PIERS and WHARVES

SHEET PILING

Untreated—

Dense No. 1 Common Heart (85% Girth Meas.)
Dense Merchantable

Treated—

Square Edge and Sound
No. 1 Common

CRIB TIMBERS

Untreated—

No. 1 Common Heart
Merchantable

Treated—

Square Edge and Sound
No. 1 Common

*Usually ordered as special clear stock, not covered by standard grade specifications.

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FENDERS AND FENDER SHEETING

Untreated—

Select Structural
Dense Merchantable

Treated—

Square Edge and Sound
No. 1 Common

DECKING (HEAVY SERVICE)

Untreated—

No. 1 Common Heart (85% on both faces)
Merchantable

Treated—

Square Edge and Sound
Dense No. 1 Common

DECKING (LIGHT SERVICE)

Untreated—

No. 1 Common Heart (85% on both faces)
Merchantable

Treated—

No. 1 Common

RECOMMENDED DESIGN PRACTICE

LOAD CLASSIFICATION OF BUILDINGS

The safe load tables which are published herewith give the size and spacing of floor joists for all spans from ten (10) feet to twenty-six (26) feet for seven (7) different classes of buildings based on the required floor loads. The required live loads have been selected for the respective occupancies after careful consideration of the building code specifications which obtain throughout the United States and the recommendations of the Building Code Committee of the Department of Commerce. The gross load specified in each class includes an allowance of fifteen (15) to twenty-five (25) pounds per square foot, dead load, depending upon the character and size of the floor timbers and the construction which would normally be used in that type of building.

Class 1 For use in all buildings with unplastered ceilings, no limit being placed on deflection. The safe load specified is determined by the safe bending stress of the member;

Class 2 Residence buildings having floors and flat roofs with plastered ceilings; limited deflection. Gross Load 60 lbs. sq. ft.;

Class 3 Office and school buildings; limited deflection; Gross Load 80 lbs. sq. ft.;

Class 4 Department stores, light manufac-

turing buildings, garages and stables; limited deflection; Gross Load 100 lbs. sq. ft.;

Class 5 Places of public assembly and roof gardens; limited deflection; Gross Load 125 lbs. sq. ft.;

Class 6 Heavy manufacturing and light storage buildings; limited deflection; Gross Load 175 lbs. sq. ft.;

Class 7 Heavy storage building; limited deflection; Gross Load 225 lbs. sq. ft.

WORKING STRESSES

The recommended practice for all sizes and spacing of joists, of girders and of columns is based on the use of a fiber stress of 1800 lbs. per square inch, a permissible horizontal shear of 175 lbs. per square inch and a modulus of elasticity of 1,600,000 lbs. per square inch.* The tabular loads are safe for use with a selected common grade of dimension for joist construction and the select structural grade for girder construction. The safe loads for columns have been based on the use of general structural grades. If dense material is employed, the column loads may be increased one-eighth ($\frac{1}{8}$). If the common grade is used, the column loads should be reduced one-quarter ($\frac{1}{4}$).

USE OF TABLES

Each table of floor construction is headed by the given span and the complete Load Classification of buildings. If the safe tabular load occurs above the horizontal broken line in the load classification column under consideration, the corresponding joist and spacing may be used in the particular case. Where there is a choice of several sizes of beams and joist spacings for the same occupancy and span, the most economical combination can be selected by an inspection of the amount of board feet of lumber required for the construction which is listed opposite to the size and spacing. Special attention is directed to the fact that the sizes of joists required to limit deflection to 1-360 of the span have a safe bending capacity far in excess of the live load requirements specified for the different classes of occupancy. If floor constructions are designed on the basis of limited deflections, the required live loads particularly for human occupancies need not be so exacting.

*For a complete discussion of working stresses, see Bulletin No. 3 of this series.

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TABLE 1—Floor Construction—Span 10' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Foot of Lumber Per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			1	2 60 lbs. sq. ft.	3 80 lbs. sq. ft.	4 100 lbs. sq. ft.	5 120 lbs. sq. ft.	6 175 lbs. sq. ft.	7 225 lbs. sq. ft.
2x6	12	1.00	103	57					
	16	.75	77						
	20	.60	62						
	24	.50	51						
3x6	12	1.50	166	90	90				
	16	1.13	125	68					
	20	.90	100						
	24	.75	83						
2x8	12	1.33	183	135	135	135			
	16	1.00	137	101	101				
	20	.80	110	81	81				
	24	.67	91	68					
3x8	12	2.00	309	229	229	229	229	229	229
	16	1.50	232	172	172	172	172	172	
	20	1.20	185	138	138	138			
	24	1.00	154	115	115				
4x8	12	2.67	422	312	312	312	312	312	312
	16	2.00	316	234	234	234	234	234	234
	20	1.60	253	187	187	187	187	187	
	24	1.33	211	156	156	156			
2x10	12	1.67	293	276	276	276	276	276	276
	16	1.25	220	207	207	207	207	207	
	20	1.00	176	166	166	166	166		
	24	.83	147	138	138	138			
3x10	12	2.50	496	463	463	463	463	463	478
	16	1.87	372	347	347	347	347	347	347
	20	1.50	297	278	278	278	278	278	278
	24	1.25	248	232	232	232	232	232	232

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

TABLE 2—Floor Construction—Span 12' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Foot of Lumber Per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			1	2 60 lbs. sq. ft.	3 80 lbs. sq. ft.	4 100 lbs. sq. ft.	5 120 lbs. sq. ft.	6 175 lbs. sq. ft.	7 225 lbs. sq. ft.
2x6	12	1.00	71						
	16	.75	54						
	20	.60	43						
	24	.50	36						
3x6	12	1.50	115						
	16	1.13	86						
	20	.90	69						
	24	.75	58						
2x8	12	1.33	127	77	77				
	16	1.00	95	58					
	20	.80	76						
	24	.67	63						
3x8	12	2.00	215	132	132	132	132		
	16	1.50	161	99	99				
	20	1.20	129	79	79				
	24	1.00	107	66					
4x8	12	2.67	293	180	180	180	180	180	180
	16	2.00	219	135	135	135	135		
	20	1.60	175	108	108	108			
	24	1.33	147	90	90				
2x10	12	1.67	204	159	159	159	159		
	16	1.25	153	119	119	119			
	20	1.00	122	95	95				
	24	.83	102	80	80				
3x10	12	2.50	345	269	269	269	269	269	269
	16	1.87	259	202	202	202	202	202	
	20	1.50	207	161	161	161	161		
	24	1.25	172	135	135	135	135		
4x10	12	3.33	470	366	366	366	366	366	366
	16	2.50	353	275	275	275	275	275	275
	20	2.00	282	220	220	220	220	220	220
	24	1.67	235	183	183	183	183		
2x12	12	2.00	298	282	282	282	282	282	282
	16	1.50	224	212	212	212	212	212	
	20	1.20	179	169	169	169			
	24	1.00	149	141	141	141			
3x12	12	3.00	505	478	478	478	478	478	478
	16	2.25	378	359	359	359	359	359	359
	20	1.80	303	287	287	287	287	287	287
	24	1.50	253	239	239	239	239	239	239

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

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TABLE 3—Floor Construction—Span 14' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Size of Lumber Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			1	2	3	4	5	6	7
2x6	12	1.00	52						
	16	.76	39						
	20	.60	31						
	24	.50	26						
3x6	12	1.50	85						
	16	1.13	64						
	20	.90	51						
	24	.75	43						
2x8	12	1.33	93						
	16	1.00	70						
	20	.80	56						
	24	.67	47						
3x8	12	2.00	158	83					
	16	1.50	118	62					
	20	1.20	95						
	24	1.00	79						
4x8	12	2.67	215	114	114	114			
	16	2.00	161	86	86				
	20	1.60	129	67					
	24	1.33	108						
2x10	12	1.67	150	100	100	100			
	16	1.26	112	75	75				
	20	1.00	90	60					
	24	.83	75						
3x10	12	2.50	253	170	170	170	170	170	
	16	1.87	190	128	128	128			
	20	1.50	152	102	102				
	24	1.25	127	85	85				
4x10	12	3.33	346	231	231	231	231	231	231
	16	2.50	259	173	173	173	173	173	
	20	2.00	208	138	138	138	138		
	24	1.67	173	116	116				
2x12	12	2.00	219	178	178	178	178	178	
	16	1.50	164	134	134	134			
	20	1.20	132	107	107				
	24	1.00	110	89	89				
3x12	12	3.00	371	301	301	301	301	301	301
	16	2.25	278	226	226	226	226	226	
	20	1.80	223	181	181	181	181		
	24	1.50	186	151	151	151			
4x12	12	4.00	506	411	411	411	411	411	411
	16	3.00	379	309	309	309	309	309	
	20	2.40	303	247	247	247	247	247	
	24	2.00	253	206	206	206			
2x14	12	2.33	325	310	310	310	310	310	310
	16	1.75	244	233	233	233	233	233	233
	20	1.40	195	186	186	186	186	186	
	24	1.17	162	155	155	155	155		
3x14	12	3.50	512	485	485	485	485	485	485
	16	2.63	384	364	364	364	364	364	
	20	2.10	307	291	291	291	291	291	
	24	1.75	256	243	243	243	243	243	243

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

TABLE 4—Floor Construction—Span 16' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Size of Lumber Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			1	2	3	4	5	6	7
3x6	12	1.50	65						
	16	1.13	49						
	20	.90	39						
	24	.75	33						
2x8	12	1.33	71						
	16	1.00	53						
	20	.80	43						
	24	.67	36						
3x8	12	2.00	121	56					
	16	1.50	91						
	20	1.20	73						
	24	1.00	60						
4x8	12	2.67	165	76	76				
	16	2.00	124	57					
	20	1.60	99						
	24	1.33	82						
2x10	12	1.67	115	67	67				
	16	1.26	86						
	20	1.00	69						
	24	.83	57						
3x10	12	2.50	197	114	114	114			
	16	1.87	145	86	86				
	20	1.50	116	67					
	24	1.25	97	57					
4x10	12	3.33	265	155	155	155	155		
	16	2.50	199	116	116	116			
	20	2.00	159	93	93				
	24	1.67	133	78	78				
2x12	12	2.00	168	119	119	119			
	16	1.50	126	89	89				
	20	1.20	101	72					
	24	1.00	84	60					
3x12	12	3.00	284	202	202	202	202	202	
	16	2.25	213	152	152	152	152		
	20	1.80	170	121	121	121	121		
	24	1.50	142	101	101	101			
4x12	12	4.00	387	276	276	276	276	276	276
	16	3.00	290	207	207	207	207	207	
	20	2.40	232	165	165	165	165		
	24	2.00	194	138	138	138			
2x14	12	2.33	249	208	208	208	208	208	
	16	1.76	187	156	156	156	156		
	20	1.40	140	125	125	125			
	24	1.17	115	101	101				
3x14	12	3.50	328	245	245	245	245	245	245
	16	2.63	253	195	195	195	195	195	
	20	2.10	205	153	153	153	153		
	24	1.75	165	124	124	124			
4x14	12	4.67	534	445	445	445	445	445	445
	16	3.50	400	334	334	334	334	334	
	20	2.80	321	267	267	267	267	267	
	24	2.33	267	223	223	223	223	223	
2x16	12	2.67	329	314	314	314	314	314	314
	16	2.00	247	236	236	236	236	236	
	20	1.60	197	188	188	188	188	188	
	24	1.33	165	157	157	157	157		
3x16	12	4.00	616	495	495	495	495	495	495
	16	3.00	387	360	360	360	360	360	
	20	2.40	310	296	296	296	296	296	
	24	2.00	258	248	248	248	248	248	248

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

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TABLE 6—Floor Construction—Span 20' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Feet of Lumber per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			CLASS						
			1	2	3	4	5	6	7
			60 lbs. sq. ft.	80 lbs. sq. ft.	100 lbs. sq. ft.	125 lbs. sq. ft.	150 lbs. sq. ft.	175 lbs. sq. ft.	225 lbs. sq. ft.
3x8	12	2.00	77						
	16	1.50	58						
	20	1.20	46						
	24	1.00	38						
4x8	12	2.67	105						
	16	2.00	79						
	20	1.60	63						
	24	1.33	52						
2x10	12	1.67	73						
	16	1.25	55						
	20	1.00	44						
	24	.83	36						
3x10	12	2.50	124	59					
	16	1.87	93						
	20	1.50	74						
	24	1.25	62						
4x10	12	3.33	169	79	79				
	16	2.50	127	60					
	20	2.00	101						
	24	1.67	85						
2x12	12	2.00	107	61					
	16	1.50	80						
	20	1.20	64						
	24	1.00	53						
3x12	12	3.00	182	103	103				
	16	2.25	137	77	77				
	20	1.80	109	62					
	24	1.50	91						
4x12	12	4.00	348	141	141	141			
	16	3.00	186	106	106	106			
	20	2.40	149	85	85				
	24	2.00	124	71					
2x14	12	2.33	160	106	106				
	16	1.75	120	80	80				
	20	1.40	96	64					
	24	1.17	80						
3x14	12	3.50	251	167	167	167			
	16	2.63	188	125	125	125			
	20	2.10	150	100	100	100			
	24	1.75	126	84	84				
4x14	12	4.67	342	227	227	227	227		227
	16	3.50	257	170	170	170			
	20	2.80	205	136	136	136			
	24	2.33	171	114	114				
2x16	12	2.67	210	161	161	161			
	16	2.00	157	121	121	121			
	20	1.60	126	96	96				
	24	1.33	105	81					
3x16	12	4.00	330	252	252	252	252		252
	16	3.00	247	189	189	189			
	20	2.40	198	151	151	151			
	24	2.00	165	126	126				
4x16	12	5.33	450	342	342	342	342		342
	16	4.00	337	258	258	258			
	20	3.20	270	206	206	206			
	24	2.67	225	172	172	172			

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

TABLE 5—Floor Construction—Span 18' 0"

Nominal Size of Joist, Inches	Spacing of Joist, Inches	Board Feet of Lumber per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.						
			CLASS						
			1	2	3	4	5	6	7
			60 lbs. sq. ft.	80 lbs. sq. ft.	100 lbs. sq. ft.	125 lbs. sq. ft.	150 lbs. sq. ft.	175 lbs. sq. ft.	225 lbs. sq. ft.
2x8	12	1.33	56						
	16	1.00	42						
	20	.80	33						
	24	.67	28						
3x8	12	1.67	71						
	16	1.25	54						
	20	1.00	47						
	24	.80	39						
4x8	12	2.00	97						
	16	1.50	78						
	20	1.20	65						
	24	1.00	54						
2x10	12	1.67	90						
	16	1.25	68						
	20	1.00	54						
	24	.83	45						
3x10	12	2.50	153	80	80				
	16	1.87	115	60					
	20	1.50	92						
	24	1.25	77						
4x10	12	3.33	209	109	109				
	16	2.50	157	82	82				
	20	2.00	131	65					
	24	1.67	104						
2x12	12	2.00	133	84	84				
	16	1.50	100	63					
	20	1.20	80						
	24	1.00	67						
3x12	12	3.00	225	142	142	142			
	16	2.25	168	107	107				
	20	1.80	135	85					
	24	1.50	112	72					
4x12	12	4.00	306	194	194	194	194		
	16	3.00	229	145	145	145			
	20	2.40	184	116	116				
	24	2.00	153	97	97				
2x14	12	2.33	197	146	146	146			
	16	1.75	148	110	110				
	20	1.40	118	88					
	24	1.17	99						
3x14	12	3.50	259	163	163	163			
	16	2.63	192	127	127	127			
	20	2.10	158	101	101				
	24	1.75	134	81	81				
4x14	12	4.67	312	221	221	221	221		221
	16	3.50	234	166	166	166			
	20	2.80	187	133	133	133			
	24	2.33	155	106	106				
2x16	12	2.67	221	166	166	166			
	16	2.00	166	127	127	127			
	20	1.60	133	101	101				
	24	1.33	111	81					
3x16	12	4.00	347	252	252	252	252		252
	16	3.00	260	206	206	206			
	20	2.40	208	166	166				
	24	2.00	174	133	133				
4x16	12	5.33	473	342	342	342	342		342
	16	4.00	355	267	267	267			
	20	3.20	288	214	214	214			
	24	2.67	236	172	172	172			

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

Southern Pine Association

TABLE 8—Floor Construction—Span 24' 0"

Nominal Joist, Inches	Spacing Joist, Inches	Board Feet Lumber Per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.					
			1	2	3	4	5	6
3x8	12	2.00	53					
	16	1.50	40					
	20	1.20	32					
	24	1.00	27					
4x8	12	2.67	73					
	16	2.00	55					
	20	1.60	44					
	24	1.33	37					
2x10	12	1.87	51					
	16	1.41	38					
	20	1.13	30					
	24	.93	26					
3x10	12	2.50	66					
	16	1.87	49					
	20	1.50	39					
	24	1.25	32					
4x10	12	3.33	117					
	16	2.50	88					
	20	2.00	70					
	24	1.67	58					
2x12	12	2.00	74					
	16	1.50	55					
	20	1.20	43					
	24	1.00	37					
3x12	12	3.00	125	60				
	16	2.25	94					
	20	1.80	75					
	24	1.50	63					
4x12	12	4.00	172	82	82			
	16	3.00	129	62	62			
	20	2.40	103					
	24	2.00	86					
2x14	12	2.33	111	62				
	16	1.76	83					
	20	1.41	67					
	24	1.17	55					
3x14	12	3.60	174	96	96			
	16	2.63	130	72	72			
	20	2.10	104					
	24	1.76	87					
4x14	12	4.67	237	131	131	131		
	16	3.50	178	98	98	98		
	20	2.80	142	79	79	79		
	24	2.33	118	66	66	66		
2x16	12	2.67	146	93	93			
	16	2.00	109	70	70			
	20	1.60	87					
	24	1.33	73					
3x16	12	4.00	229	146	146	146		
	16	3.00	172	110	110	110		
	20	2.40	137	88	88	88		
	24	2.00	114	73	73	73		
4x16	12	5.33	312	199	199	199	199	
	16	4.00	234	149	149	149	149	
	20	3.20	187	120	120	120	120	
	24	2.67	156	100	100	100	100	

Loads in Columns 2, 3, 4, 5 and 6 limited by safe deflection.

TABLE 7—Floor Construction—Span 22' 0"

Nominal Joist, Inches	Spacing Joist, Inches	Board Feet Lumber Per Sq. Ft.	LOAD CLASSIFICATION OF BUILDINGS All Loads in Lbs. per Sq. Ft.					
			1	2	3	4	5	6
3x8	12	2.00	64					
	16	1.50	47					
	20	1.20	36					
	24	1.00	32					
4x8	12	2.67	87					
	16	2.00	65					
	20	1.60	52					
	24	1.33	44					
2x10	12	1.87	60					
	16	1.41	45					
	20	1.13	36					
	24	.93	30					
3x10	12	2.50	102					
	16	1.87	76					
	20	1.50	61					
	24	1.25	51					
4x10	12	3.33	140	60				
	16	2.50	105					
	20	2.00	84					
	24	1.67	70					
2x12	12	2.00	89					
	16	1.50	67					
	20	1.20	53					
	24	1.00	45					
3x12	12	3.00	150	77	77			
	16	2.25	112					
	20	1.80	90					
	24	1.50	75					
4x12	12	4.00	205	108	108	106		
	16	3.00	154	80	80			
	20	2.40	123	64	64			
	24	2.00	102					
2x14	12	2.33	132	80	80			
	16	1.75	99	60	60			
	20	1.40	79					
	24	1.17	66					
3x14	12	3.60	207	125	125	125		
	16	2.63	155	94	94			
	20	2.10	124	75	75			
	24	1.76	103	63	63			
4x14	12	4.67	282	171	171	171	171	
	16	3.50	212	128	128	128	128	
	20	2.80	169	103	103	103	103	
	24	2.33	141	86	86	86	86	
2x16	12	2.67	174	121	121	121		
	16	2.00	131	91	91			
	20	1.60	104	73	73			
	24	1.33	87	61	61			
3x16	12	4.00	273	190	190	190	190	
	16	3.00	205	142	142	142	142	
	20	2.40	164	114	114	114	114	
	24	2.00	136	95	95	95	95	
4x16	12	5.33	372	258	258	258	258	258
	16	4.00	279	194	194	194	194	194
	20	3.20	223	155	155	155	155	155
	24	2.67	186	129	129	129	129	129

Loads in Columns 2, 3, 4, 5, 6 and 7 limited by safe deflection.

Southern Pine Association

TABLE 10—Girders

GROSS LOAD IN POUNDS PER LINEAR FOOT, INCLUDING WEIGHT OF GIRDER, -LIMITED BY EXTREME FIBRE STRESS IN BENDING														
Nominal Size of Girder, in Inches	Board Feet of Lumber per Foot, of Girder	SPAN IN FEET												
		6	8	10	12	14	16	18	20	22	24	26	28	30
4x6	2.00	637	359	229	159									
6x6	3.00	924	520	333	231									
4x8	2.67	1094	660	422	293	215	165							
6x8	4.00	1605	967	619	430	316	242							
8x8	5.33	2187	1318	844	586	430	330							
6x10	5.00	2033	1523	993	689	507	388	306	248					
8x10	6.67	2770	2080	1354	940	690	529	418	339					
10x10	8.33	3610	2630	1715	1190	875	671	529	429					
6x12	6.00	2460	1848	1455	1010	742	568	448	364	301	252			
8x12	8.00	3355	2515	1984	1377	1012	775	612	496	409	344			
10x12	10.00	4250	3188	2513	1745	1281	982	776	628	519	437			
12x12	12.00	5140	3860	3042	2113	1551	1188	939	761	628	528			
6x14	7.00	2890	2170	1733	1392	1022	783	619	501	414	348	296	256	
8x14	9.33	3940	2955	2363	1898	1395	1067	843	684	565	474	404	349	
10x14	11.67	4985	3745	2993	2407	1768	1352	1068	866	715	601	512	442	
12x14	14.00	6040	4530	3623	2913	2140	1636	1293	1048	866	728	620	535	
14x14	16.33	7090	5320	4253	3418	2510	1920	1520	1230	1017	855	728	628	
6x16	8.00	3315	2490	1989	1656	1348	1032	815	660	546	458	391	337	294
8x16	10.67	4520	3393	2713	2260	1840	1407	1113	901	744	626	533	460	401
10x16	13.33	5730	4300	3436	2867	2330	1782	1410	1141	944	792	676	582	508
12x16	16.00	6930	5200	4159	3465	2820	2159	1705	1382	1140	960	816	705	614
14x16	18.67	8150	6110	4883	4070	3310	2533	2000	1622	1340	1126	960	827	721
16x16	21.33	9350	7010	5606	4670	3800	2910	2296	1862	1539	1293	1104	950	828

Loads to the Left of the Heavy Broken Line are limited by Horizontal Shear.

TABLE 9—Floor Construction—Span 26'-0"

Nominal Size of Joist, in Inches	Spacing of Joist, in Feet	Board Feet of Lumber Per Sq. Ft.	LOAD CLASSIFICATION				
			Floor Joist, All Loads in Lbs. per Sq. Ft.				
			1	2	3	4	5
3x10	12	2.50	73				
	16	1.87	54				
	20	1.50	44				
	24	1.25	37				
4x10	12	3.33	100				
	16	2.50	75				
	20	2.00	60				
	24	1.67	50				
2x12	12	2.00	63				
	16	1.50	47				
	20	1.20	38				
	24	1.00	32				
3x12	12	3.00	108				
	16	2.25	81				
	20	1.80	65				
	24	1.50	54				
4x12	12	4.00	147	65			
	16	3.00	110				
	20	2.40	88				
	24	2.00	73				
2x14	12	2.33	94				
	16	1.75	70				
	20	1.40	56				
	24	1.17	47				
3x14	12	3.50	148	76	76		
	16	2.63	111				
	20	2.10	89				
	24	1.75	74				
4x14	12	4.57	202	104	104	104	
	16	3.50	152	78	78		
	20	2.80	121	62			
	24	2.33	101				
2x16	12	2.87	124	73			
	16	2.00	93				
	20	1.60	74				
	24	1.33	62				
3x16	12	4.00	195	115	115	115	
	16	3.00	146	86	86		
	20	2.40	117	69			
	24	2.00	97				
4x16	12	5.33	266	157	157	157	157
	16	4.00	200	118	118	118	
	20	3.20	160	94	94		
	24	2.67	133	79	79		

Loads in Columns 2, 3, 4, and 5, limited by safe deflection.

Southern Pine Association

TABLE 11—Girders

Nominal Size of Girder, in inches	Board Feet of Lumber per Foot of Girder	GROSS LOAD IN POUNDS PER LINEAR FOOT, INCLUDING WEIGHT OF GIRDER, LIMITED BY A DEFLECTION OF 1/36" PER FOOT OF SPAN												
		SPAN IN FEET												
		6	8	10	12	14	16	18	20	22	24	26	28	30
4x6	2.00	589	249	127	74									
6x6	3.00	836	354	181	104									
4x8	2.67	1094	608	312	180	114	76							
6x8	4.00	1605	895	458	265	167	112							
8x8	5.33	2187	1222	624	361	229	152							
6x10	5.00	2033	1523	931	539	339	228	159	116					
8x10	6.67	2770	2080	1271	735	465	311	218	159					
10x10	8.33	3510	2630	1606	928	585	392	275	201					
6x12	6.00	2460	1848	1651	955	602	403	283	208	155	119			
8x12	8.00	3355	2515	2253	1302	821	553	386	281	211	162			
10x12	10.00	4250	3188	2855	1650	1039	697	488	356	268	206			
12x12	12.00	5140	3860	3450	1995	1256	843	590	431	324	249			
6x14	7.00	2890	2170	1733	1542	972	652	457	333	250	193	152	122	
8x14	9.33	3940	2955	2363	2105	1325	889	624	455	341	263	207	166	
10x14	11.67	4985	3745	2993	2668	1680	1125	789	576	432	333	263	210	
12x14	14.00	6040	4530	3623	3215	2030	1361	955	697	523	403	318	254	
14x14	16.33	7090	5320	4253	3790	2385	1600	1123	820	614	473	374	299	
6x16	8.00	3315	2490	1989	1656	1472	987	693	504	379	292	230	184	150
8x16	10.67	4520	3393	2713	2260	2010	1348	945	689	516	398	314	251	205
10x16	13.33	5730	4300	3436	2867	2545	1701	1196	873	654	505	398	318	259
12x16	16.00	6930	5200	4159	3465	3080	2065	1445	1055	792	610	482	385	314
14x16	18.67	8150	6110	4883	4070	3610	2425	1700	1239	909	715	565	452	368
16x16	21.33	9350	7010	5606	4670	4155	2785	1953	1422	1068	824	650	520	423

Loads to the Left of the Heavy Broken Line are limited by Horizontal Shear.

TABLE 12—Columns

Nominal Size of Column in inches	Board Feet of Lumber per Foot Length of Column	GROSS LOAD IN THOUSANDS OF POUNDS												
		Formula—General Structural Grades $\frac{P}{A} = 1200 \left(1 - \frac{l}{75} \times \frac{l}{d} \right)^2$												
		CLEAR LENGTH												
		8 ft.	9 ft.	10 ft.	11 ft.	12 ft.	13 ft.	14 ft.	15 ft.	16 ft.	18 ft.	20 ft.		
4x4	1.33	10.0	9.5	8.9										
6x6	3.00	28.5	27.6	26.6	25.7	24.7	23.7	22.8	21.8					
8x8	5.33	56.6	55.4	54.0	52.7	51.4	50.0	48.5	47.2	46.0	43.2	40.5		
10x10	8.33	94.5	92.6	91.0	89.1	87.5	85.9	84.0	82.4	80.5	77.0	73.7		
12x12	12.00	142.0	140.0	137.6	135.2	133.1	131.0	129.0	127.0	124.8	120.5	116.3		
14x14	16.33	198.8	196.0	193.9	191.2	189.0	186.2	183.5	181.3	178.9	174.0	169.0		
16x16	21.33	266.0	263.0	260.0	256.6	254.0	251.5	248.4	245.5	242.1	236.5	231.2		
18x18	27.00	338.0	335.0	331.5	328.0	325.5	322.0	318.2	315.5	312.0	305.2	302.2		
Round														
4	1.05	10.3	9.7	9.1										
6	2.36	26.7	25.8	24.9	24.0	23.1	22.2	21.3	20.6					
8	4.19	50.6	49.4	48.3	47.0	45.8	44.6	43.4	42.2	41.0	38.6	36.2		
10	6.54	82.4	80.7	79.3	77.8	76.0	74.8	73.2	71.6	70.0	67.0	64.1		
12	8.44	121.2	119.5	117.8	116.0	114.0	112.1	110.5	108.4	106.8	103.1	99.6		
14	12.82	167.8	165.6	163.7	161.1	159.1	157.2	155.0	153.0	150.9	146.7	142.6		
16	16.75	222.0	220.0	217.2	214.5	212.2	210.0	208.0	205.3	202.2	198.0	193.1		
18	21.20	283.9	281.2	278.5	276.0	273.5	270.2	268.0	265.1	262.0	256.2	251.5		

* NOTE: For Dense Material, add $\frac{1}{4}$ to tabular load. For Common Grade deduct $\frac{1}{4}$ of tabular load.

⑦ SPA-1 COM.

⑦ SPA-2 COM.

⑦ SPA-3 COM.

⑦ SPA-4 COM.

⑦ SPA-C

⑦ SPA-B&BEG

⑦ SPA-1 E.G.

⑦ SPA-SE&S.

⑦ SPA-1 HRT.

⑦ SPA-B&B

⑦ SPA-B&BHT

⑦ SPA-C E.G.

⑦ SPA-MERCH.

⑦ SPA-B&BHTEG

⑦ SPA-2 E.G.

"GRADE-MARKS ON LUMBER ARE THE CUSTOMER'S GUARANTY"

—From a Bulletin of the
United States Department of Commerce.

HERETOFORE lumber has generally been sold without any identification marks as to the grade or source of origin. This practice led to much misunderstanding and dissatisfaction on the part of the public. Buyers frequently thought that they were not getting the grade of lumber paid for, and in some cases this was doubtless a fact.

As a means of correcting the situation and making lumber buying simple and safe, a group of manufacturers comprising the Southern Pine Association undertook, in accordance with recommendations of Hon. Herbert Hoover, Secretary of Commerce, to mark the grade on the end of each piece of lumber shipped from their mills. In addition to the grade, the mark also shows the number of the mill which produced the lumber, and the official S P A label, which indicates that the lumber was manufactured in accordance with the American Lumber Standards, and that it was graded by inspectors whose efficiency is subject to frequent test and examination by official inspectors of the SOUTHERN PINE ASSOCIATION.

Regarding this movement, Secretary Hoover says:

"The grade-marking of lumber is an excellent idea. It will tend not only toward a more economical distribution, but it is a big step toward better merchandising and will directly benefit the manufacturer, middleman, and consumer."

You will be certain of getting standard lumber of guaranteed grade, if you have your lumber dealer furnish you S P A grade-marked and trade-marked
SOUTHERN PINE